Space Weather Forecast

Issued on Saturday, 10 February 2024 at 01:28 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Current Moderate Solar Radiation Storm likely declining. Further Minor/Moderate Radio Blackouts Likely. Slight Chance Minor Geomagnetic Storm to start, increasing into the period.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been High over the past 24 hours, with one major Strong class flare observed at 09/1314UTC, associated with an active region which now lies over the southwestern limb. The large region currently on the disk produced two Moderate class flares. There are currently six numbered regions on the visible disc, with the likely source of the recent significant flare activity no longer visible over the southwestern limb. The large and complex region near centre disk remains dominant in terms of complexity and size. There has been some slight development in the collections of spots on its leading northern edge, however the complex internal structure appears largely unchanged. Other spots on the facing side were unremarkable by contrast.

No clear Earth directed Coronal Mass Ejection (CME) observed in available coronagraph imagery, although investigation continues surrounding the most recent Moderate class flare. Other CME-generated events were largely associated with the off-going southwestern limb regions, with no Earth effects anticipated. This includes the significant CME associated with the Strong flare. This CME is not expected to have any significant Earth-directed component given its position beyond the limb although some shock enhancement cannot be completely ruled out.

Solar Wind / Geomagnetic Activity: Solar winds were initially Slightly Elevated, with speeds near 480km/s with a slowly declining trend. Winds declined to a minimum of around 380km/s before a shock was observed, commencing around 09/2140UTC. This likely the glancing arrival of the 06 Feb CME, resulting in winds increasing to around 490km/s, before subsequently declining to around 440km/s by the end of the period. The IMF generally weak but briefly peaking into moderate levels with the CME arrival. The north-south component varying weakly and largely positive following CME arrival. Geomagnetic activity generally Quiet, but with Unsettled condition (Kp3) recorded following the CME arrival.

Energetic Particles / Solar Radiation: Solar radiation levels rose steadily following the Strong flare, rising above S1 Minor Strom levels (10pfu) from 09/1549UTC and S2 Moderate Storm levels (100pfu) from 09/1815UTC, where despite some slight fluctuations it remains.

Four-Day Space Weather Forecast Summary

Solar Activity: Moderate X-ray flare activity likely, and a slight chance of further Strong-class activity a slight chance, with the very large region near centre disk providing the vast majority of the risk as the active region responsible for the strong flare on the 09 Feb continues to rotate away.

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Solar Wind / Geomagnetic Activity: Multiple glancing CMEs may feature in the period: firstly likely ongoing from the CME on the 06 February which may bring a very slight Chance of G1 inside the coming 24 hours, and then a second event from the 08/2030UTC eruption, that brings a Chance of G1 into day 3 (12 Feb). Overall a Slight Chances of G1 to start the four-day period, with generally Quiet to Unsettled conditions expected. A chance of G1 Minor Storm conditions following into days 3-4 given the potential for CME enhancement both from those mentioned above but also any further events, most likely associated with the large sunspot region near centre disk.

Energetic Particles / Solar Radiation: Solar radiation levels currently at S2 Moderate Solar Radiation Storm levels following earlier enhancement from the Strong flare. Solar radiation levels should begin to subside through day 1 (10 Feb), although likely persisting into day 2 (11 Feb) above background levels, and there will remain an elevated potential to rise above the S1/Minor Radiation Storm level in response to any significant flares into the period.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	5	5	30	30
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	70	70	70	70
Very Active	R3 to R5 X	Yes	20	20	20	20

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	Yes	99	60	30	20
Very Active	≥ S3 *	No	2	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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